

FOSSIL FUNGUS (*HYPOXYLON*) FROM TERTIARY BROWN COAL,
YALLOURN, VICTORIA, AUSTRALIA

By J. H. WILLIS

National Herbarium, Melbourne

EDMUND D. GILL

National Museum of Victoria

Occurrence (E.D.G.)

At Yallourn in E. Victoria, a seam of brown coal up to 170 ft thick has been extensively worked for power production, yielding at the same time a rich fossil flora. This formation is the Yallourn Seam, and the underclay is the Yallourn Clay (Thomas and Baragwanath 1949). The specimen now described was found near the base of the Yallourn Seam on a Muscum collecting trip in 1950. In the section exposed, about 4 ft 6 in. of Yallourn Clay outcropped. The contact between the Yallourn Seam and the Yallourn Clay was approximately horizontal, but a narrow seam of brown coal a few feet from the top of the clay had a dip of about 5°, suggesting warping and some erosion of the clay before the brown coal of the Yallourn Seam was deposited. The top of the Yallourn seam is an erosion surface, but to a much greater degree. In the clay between the Yallourn Seam and the narrow band of brown coal referred to above was what appeared to be an animal burrow. This structure appeared in vertical section and was about 1 ft 10 in. deep; it began as a shaft about 4 in. in diameter and after a foot widened to a rounded cavity about 10 in. in diameter. The burrow was infilled with brown coal.

The base of the coal showed rapid change of facies. Lignitiferous clay (product of erosion of the underclay?) was followed by a layer rich in leaves and containing remains of *Agathis*, *Banksia*, *Araucaria*, and *Podocarpus*, then a resinous layer with leaves, a layer dominated by branches with bark still attached, and a layer with logs, wood, and fern stems. One stump in position of growth was noted in the base of the coal at the collecting site. There was not time to make a complete section, but 15 to 20 ft above the base of the coal was pollen coal 6 to 9 in. thick, followed by a layer rich in mummified leaves. The fossil fungus came from this layer. The plate shows the relationship of the fungus to the leaves.

The superficially close resemblance of the fossil specimen to a cluster of insect eggs prompted submission of a photograph to Dr W. E. China at the British Museum. He reported that, although the general appearance and position in clusters reminded one of hemipterous eggs, there was too much variation in size to admit such a possibility. Dr China showed the photograph to Mrs Balfour Browne who recognized the fungal nature of the objects and recommended that they be given to Mr J. H. Willis for description.

Age (E.D.G.)

The seams of coal have not yet been individually dated, and not even the groups of sediments have been adequately aged. Thomas and Baragwanath (1949, p. 43) and Gloc (1960) have provided the stratigraphy of the Latrobe Valley

Coal Measures, and so the relative ages of the seams are known. The general succession is:

Yallourn Group (youngest)	Yallourn Seam (fossil fungus) Yallourn Clay
Morwell Group	
Yinnar Group	
Narracan Group (oldest)	Associated with Older Basalt.

These Coal Measures probably range in age from Eocene to Oligocene. The flora found at Yallourn occurs underneath Miocene marine rocks in a number of places, and the Older Basalts are older than the Miocene Nunawading Terrain (Gill 1964). Until the needed detailed work is done, the best dating that can be given for the fossil fungus is Oligocene.

Identification and discussion (J.H.W.)

A brief inspection was enough to show remarkably close external resemblance to the living *Hypoxylon truncatum* (Schweinitz ex Fries) J. H. Miller (1932). Both have erumpent but confluent, subglobular, black and carbonous perithecia, each 0.5-1.3 mm in diameter, with flat apical annular disc (0.3-0.5 mm wide) from the centre of which projects a minute, conical, nipple-like ostiole. Ascospores removed from the fossil perithecia proved to be identical with those of living *H. truncatum* collected from dead bark in the Dandenong Ranges, viz. 9.5-12.5 \times 4.5-5 mic., irregularly elliptic (or bean-shaped), dull brown, with a distinct colourless longitudinal furrow or germ pore.

Botanists are understandably cautious in applying names of living plant species to fossils millions of years old, but in the present instance the writer has very little hesitation in identifying the Yallourn *Hypoxylon* as *H. truncatum* (syn. *H. annulatum* Mont.). According to J. H. Miller (1961), *H. truncatum* occurs on many kinds of dicotyledonous trees, and it ranges almost throughout warmer regions of the world, e.g. Africa, Australia, India, Malaya, China, Japan, Hawaii, southern parts of U.S.A., Mexico, West Indies, tropical and subtropical South America; so it is hardly surprising that such a very widespread modern fungus should also have a long geological history.

Only one species of *Hypoxylon* in the section Annulata seems now to occur in Europe, viz. *H. michelianum* Ces. & De Not. which is known from Italy, apparently always on *Laurus nobilis*. It is closely related to *H. truncatum*, differing in the consistently smaller annular discs (0.1-0.3 mm wide). But brown coal deposits of Limburg province, Holland, have provided a fossil *Hypoxylon* published by R. Kräusel (1961) under the name *Sphaerites areolatus* (G. Fresenius & H. Meyer) A. Meschinelli, with the remark (translated from German): 'Even with knowledge of the spores, it could be impossible to refer such fossils to a definite recent genus. We must therefore designate them as a "form-genus"'. Kräusel describes the perithecia ('pustules') as 0.3-0.8 mm wide, and spores 12-18 mic. long. His excellent photograph is almost a facsimile of *H. annulatum* (= *H. truncatum*) as illustrated by C. G. Lloyd (1925), and were it not for the slightly longer spores, one would scarcely hesitate to refer the Netherlands fossil also to this variable species of pan-tropical distribution.

From the Yallourn brown coal, H. T. Clifford and Isabel C. Cookson (1953) described a fossil moss capsule, while the latter author (1947) has also described four new genera and eight new species of micro-fungi from the Latrobe valley

brown coals, most occurring on mummified leaves of *Oleinites willisii* (family Oleaceae). In the same paper, Cookson (1947) presents two other new genera and four new species from Tertiary deposits on the Aire River coast (Victoria), Kiandra (N.S.W.), Ohai (N.Z.) and Kerguelen Island. All these fungi are members of the ascomycetous order *Hemisphaeriales*, of which many living representatives are components of the familiar 'sooty-mould' associations on foliage. Concerning 'larger' fungi, the writer is not aware that any fossil species has been recorded in Australia before the discovery of the specimen herein described.

Acknowledgements

The authors are grateful to Dr Isabel Cookson, University of Melbourne, who made microscopic preparations of the brittle fossil fruiting structures, and to Mr Gordon Beaton of Camperdown who accurately measured and drew the spores at a magnification of 4500.

References

- CLIFFORD, H. T., and COOKSON, ISABEL C., 1953. *Muscites yallournensis*, a fossil moss capsule from Yallourn, Victoria. *Bryologist* 56: 53-55.
- COOKSON, ISABEL C., 1947. Fossil fungi from Tertiary deposits in the Southern Hemisphere, Pt 1. *Proc. Linn. Soc. N.S.W.* 72: 207-214.
- GILL, E. D., 1964. Rocks contiguous with the basaltic cuirass of Western Victoria. *Proc. Roy. Soc. Vict.* 77: 331-355.
- GLOE, C. S., 1960. The geology of the Latrobe Valley coalfield. *Proc. Austr. Inst. Min. Metall.* 194: 57-125.
- KRÄUSEL, R., 1961. Ein Ascomycet aus der holländischen Braunkohle. *Senck. Leth.* 42: 43-48.
- LLOYD, C. G., 1925. *Mycological Notes* 7: 331, fig. 3145.
- MILLER, J. H., 1961. Monograph of the world species of *Hypoxylon*, p. 95-99 (posthumous publication).
- THOMAS, D. E., and BARAGWANATH, W., 1949. Geology of the brown coals of Victoria. Pt 1. *Min. & Geol. J. (Vict.)*: 3(6): 28-55.

Explanation of Plate

PLATE 16

Hypoxylon truncatum, a fossil colony on bark and among leaves from near base of the Yallourn Seam, Yallourn brown coal mine (open cut), Victoria. Much enlarged. National Museum of Victoria reg. no. P22651. Age: Probably Oligocene.